



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>A23L 1/00, 1/212</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/65328</b> <b>(43) International Publication Date:</b> 23 December 1999 (23.12.99)
<b>(21) International Application Number:</b> PCT/EP99/03593 <b>(22) International Filing Date:</b> 21 May 1999 (21.05.99)  <b>(30) Priority Data:</b> 98304724.2      15 June 1998 (15.06.98)      EP  <b>(71) Applicant (for all designated States except AU BB CA CY GB GD GH IE IL KE LK LS MN MW NZ SD SG SZ TT UG ZA):</b> UNILEVER N.V. [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).  <b>(71) Applicant (for AU BB CA CY GB GD GH IE IL KE LK LS MN MW NZ SD SG SZ TT UG ZA only):</b> UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London, Greater London EC4P 4BQ (GB).  <b>(72) Inventors:</b> BELMAR, Maria, Teresa; Unilever Research Colworth, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB). TAMAI, Michela; Unilever Research Colworth, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB). THOMPSON, Eric, William; Unilever Research Colworth, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB).		<b>(74) Agent:</b> WURFBAIN, Gilles, L.; Unilever NV, Patent Department, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL).  <b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> THICKENING AGENT BASED ON HOMOGENIZED VEGETABLE PUREE, ITS PREPARATION AND ITS USE IN FOODSTUFFS  <b>(57) Abstract</b> <p>A thickening agent, a process for its preparation and a process for thickening foodstuffs, in particular thickening liquid, pourable or squeezable or spoonable foodstuffs. Thickening is effected by adding to such foodstuff a homogenized vegetable puree, of which the vegetable is low in starch.</p>		

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## THICKENING AGENT BASED ON HOMOGENIZED VEGETABLE PUREE, ITS PREPARATION AND ITS USE IN FOODSTUFFS

### Field of the invention

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The present invention relates to a process for thickening foodstuffs, in particular thickening liquid, pourable or squeezable or spoonable foodstuffs, as well as to a thickening agent and the preparation thereof.

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### Background of the invention

A broad range of thickeners is conventionally employed to achieve the desired thickness and consistency of various (liquid, pourable or squeezable) foodstuffs. Well-known in this respect are the use of starch and gellable biopolymers or gums. Examples of the latter group are gelatin, agar, carrageenans, pectins, alginates, xanthan, locust bean gum etcetera.

The application of (native) starch, however, may result in a sticky mouthfeel and/or characteristic smell or flavour of starch, which is less desirable. Also, the use of starch as a thickener may result in less heat stability of the thickened foodstuff and/or retrogradation upon cooling.

The use of native starch as a thickener without gums will generally result in a gelled consistency when cooling as a result of a network formed by the amylose when leached out from the starch granules during processing, which is undesirable for preparing pourable foodstuffs such as e.g. sauces.

The disadvantage of reduced heat stability and/or retrogradation may be overcome by the application of (chemically) modified starches, which are in many countries to be labeled as such on the packaging of the foodstuff  
5 concerned, and are as such less attractive.

The use of native starch mixed in combination with certain gums may overcome some of the disadvantages of using native starch alone: applying heat will result in amylose leaching  
10 out of the starch granules, but phase separation occurs due to the presence of the gums.

The application of gums has its disadvantages as well, ranging from a tendency to produce slimy or slightly  
15 gellified foodstuffs to non-vegetable origin (e.g. gelatin) to high costs (most gums). Additional disadvantages include reduced heat-stability for many gums similar to that of starch.

20 Various solutions have been proposed in the past in order to overcome the disadvantages mentioned above. A solution w.r.t. the heat stability has been proposed in WO 95/12323. Herein it is disclosed that such problems may be overcome by application of a non-pre-gelatinised starch that is  
25 present in the foodstuff as a dispersed phase in a gum.

Another attempt to overcome some of the problems as set out above is presented in JP 57/202257 (Yakult Honsha KK).

Herein it is disclosed that soups, curry's, stews, sauces  
30 and the like may be thickened by the incorporation of smashed, steamed and homogenised vegetables which are rich in starch. Rich in starch is reported in this reference to mean vegetable containing about 70% or more starch in the dry vegetable, such as potato, sweet potato, taro, cassava,  
35 and pumpkin. The homogenisation is according to this

reference to be carried out at pressures between 30-150 bar, with 50-80 bar being preferred. The pressures actually used are 75 and 80 bar.

## 5 Summary of the invention

Although the solutions given above may be sufficient for some applications, it has been found that for others these are not sufficient. For example, the solutions as proposed  
10 by JP 57/202257 still give rise to undesired starchy flavours. Additionally, the homogenised vegetables as disclosed in that reference lead to the formation of gelled compositions upon cooling, unless gums such as gelatins (e.g. in the form of bouillons) are also included in the  
15 application.

Hence, there was a need for a process for thickening liquid, pourable or squeezable foodproducts without the disadvantages as mentioned above, preferably independent  
20 upon temperature during manufacture or use. In other words, the so obtained thickened food products should be thickened but preferably not gelled, be free of a starchy flavor or smell, be at least reasonably stable under heating and cooling conditions, and preferably provide a thickening  
25 effect both in hot (e.g. sauces, soups) or cold (e.g. sauces, dressings, mayonnaise) applications.

Furthermore, the thickened foodstuff should preferably be free of gums from non-vegetable origin (such as gelatin).  
30 Preferably, the foodstuff so prepared should also be free of other gums or thickening biopolymers. Additionally, the thickened foodstuff should be free of any grainy or sandy texture resulting from the thickener.

It has now been found that the above can be achieved by a process for thickening a liquid, pourable or squeezable foodproduct by adding to said foodproduct a vegetable homogenate obtained by subjecting a comminuted vegetable to  
5 a homogenisation treatment, wherein the vegetable contains less than 70% starch, based on dry matter. The thickening effect can be obtained both in hot and cold preparations, and compositions can be reheated without substantial change in thickening effect.

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#### Detailed description of the invention

The prior art in JP 57/202257 seems to rely on a thickening effect by liberating starch that is available in starch-  
15 rich vegetables as are exemplified therein. This still does not solve a number of the problems as set out above. For example a gum (e.g. gelatin, either added as such or in the form of a bouillon) will still be needed in order to avoid the formation of a gelled foodstuff upon cooling. This is  
20 due to the presence of starch, although now originating from starch-rich vegetables instead of a different source. The product prepared according to this reference will also result in some starchy flavour or smell being present. Also, retrogradation may occur.

25

In contrast to this, in the present invention the thickening effect is obtained also from homogenised vegetables, but now from vegetables which do not need to be high in starch content. In fact, the thickening effect is  
30 more or less independent upon the content of starch of the vegetable used, and in order to overcome some of the disadvantages related to the use of starch as a thickener (as set out above), the content of starch of the vegetable used is preferably low. For the person of average skill in  
35 the art, it is surprising that, when confronted with the

disclosure as mentioned above, a thickening effect can achieved without much starch being present.

Without wishing to be bound by any theory, it is believed  
5 that in the present invention the thickening effect is obtained by the presence of a mixture of intact vegetable cells, cell debris, cell wall fragments, etcetera.

In the process according to this invention and as set out  
10 above it is preferred that the starch content of the vegetables used for preparing the homogenised vegetable puree is less than 50% based on the dry vegetable, more preferably even lower than 35%.

15 Preferred vegetables for this invention are (apart from the above mentioned requirements) vegetables of white or pale colour, e.g. parsnips, mushrooms, cauliflower, swede, and turnips. For specific foodstuffs vegetables having a green or orange color, like carrots, broccoli, may also be used.  
20 Needless to say, mixtures may also be used. Particularly preferred vegetables are plants of the genus Brassica oleracea and also roots or root-like vegetables, all preferably being low in starch.

25 Less suitable (following their high starch content) are the vegetables as mentioned in JP 57/202257: potato, sweet potato, taro, cassava and pumpkin. Also less suitable for the purpose of the invention are tomatoes.

30 In the process according to the present invention the homogenisation treatment can be effected by any homogeniser suitable for application to foodstuffs. As various types of homogenisers operate following different principles, homogenisation pressures from one type of homogeniser to  
35 another type of homogeniser cannot be compared directly. It

was found in the present case that homogenisation of the vegetables is preferably carried out by a high pressure homogeniser at a pressure of 100-200 bar or any equivalent treatment (in terms of results) by a different type of homogeniser, such as an ultrasonic homogeniser. For some purposes, pressures higher than 150 bar may be preferred.

In the process according to the invention, it is preferred that prior to the homogenisation step the vegetables are cooked. Preferably, the homogenisation operation is also preceded by a comminuting (including chopping, slicing, etcetera) operation, leading e.g. to a puree. Depending e.g. on the vegetables chosen, they may be peeled and/or parts of the vegetable (e.g. leaf, stem, bruised spots) may be removed first.

It was found that the homogenised vegetable puree according to the invention shows very good (physical) stability, without substantial phase separation, thinning, syneresis over periods of up to 6 weeks or more.

It was also found that the homogenised vegetable compositions prepared according to the invention are free of sandy or grainy texture, and provide a smooth mouthfeel, both in pure form and upon usage in diluted form.

The homogenised vegetable prepared along the lines as set out above may be applied to a given foodstuff in any desired quantity, e.g. in an amount of 5 to 80% by weight, based on the final formulation. However, for obtaining the desired thickening effect for liquid, pourable or squeezable foodstuffs it may be preferred to incorporate the homogenised vegetable puree in the foodstuff in an amount of between 10 and 60%, more preferably 20-45% by weight based on the final food product. The amount also



depends on the vegetable used and the desired thickness. The right amount needed can readily be determined by the person of average skill in the art.

5 The material according to the invention can most suitable be added to foodstuffs which need to be liquid, pourable, squeezable or spoonable, such as soups, sauces, simmer sauces, sauce base products, dressings, mayonnaise, etcetera.

10

The homogenised vegetable puree is suitable for application to aqueous foodstuffs, in particular suitable for thickening sauces, simmer sauces, sauce base products (which are to be diluted by an aqueous liquid prior to  
15 consumption) and the like. Also, the homogenised vegetable puree can be incorporated into emulsified foodstuffs, like mayonnaise, dressings or fat/oil-containing sauces. The thickened foodstuffs according to the invention can be consumed both cold and hot, without substantial change in  
20 thickness.

Depending upon the intended use of the thickened foodstuff it may further contain water, organic acids, oil, fat, herbs, spices, comminuted vegetables, or mixtures thereof.

25

In the present invention, the use of thickeners based on non-starch like biopolymers like gelatin, agar, alginate, carrageenans, xanthan, pectins and pect(in)ic substances, CMC and the like can be dispensed with. Hence, a foodstuff  
30 thickened according to this invention preferably does not contain substantial amounts of thickeners or gellable compounds from animal origin (e.g. gelatin).

The present invention further relates to a liquid, pourable  
35 or squeezable foodproduct containing 5-80% by weight

(preferably 10-60%) of a vegetable puree, wherein the vegetable puree has been homogenised, and wherein the starch content of the vegetable is less than 70%, based on the dry vegetable. It is preferred that the vegetable in the above has been homogenised by a high-pressure homogeniser at a pressure of 100-200 bar, or any equivalent (in terms of results obtained) homogenising treatment.

The invention further relates to the use of vegetable puree, wherein the vegetable puree has been homogenised, and wherein the starch content of the vegetable is less than 70%, based on the dry vegetable for thickening liquid, pourable or squeezable foodstuffs. It is preferred that the vegetable in the above has been homogenised by a high-pressure homogeniser at a pressure of 100-200 bar, or any equivalent (in terms of results obtained) homogenising treatment.

The invention is further exemplified by the following examples, which are to be understood as to be non-limiting.

### Examples

#### Examples 1-7

Seven sauces have been prepared with different homogenised vegetables as thickener, homogenisation pressures of the vegetables, and amounts of homogenised vegetable, as set out in table 1.

For the eight examples various sauces were prepared, in which was present (percentage by weight):

sunflower oil	10 %
modified egg-yolk	0.5%
5 salt	0.4%
sugar	0.6%
homogenised vegetable:	see table 1 for amount
water:	to the balance

10 Table 1: vegetable type, amount and homogenisation pressures.

Example	Vegetable used	amount of homogenised vegetable (wt %)	Homogenisation pressure (bar)
1	Parsnips	45%	150
2	Parsnips	45%	200
3	Parsnips	45%	100
4	Parsnips	60%	150
5	Parsnips	45%	150
6	Carrots	75%	150
7	Broccoli	45%	150

#### Processing examples 1-4

15 The vegetables were peeled, sliced and cooked in deionized boiling water for 15 minutes. Thereafter, they were pureed in an industrial food processor (Robocoup Juicer) with a 0.5 mm sieve.

The so-obtained vegetable purees were added to a pre-  
20 emulsion, which was prepared by mixing water, modified egg yolk, and oil in the amounts given above, after which salt and sugar were added.

The so-prepared mixture was passed through a high-pressure homogeniser (type Niro Soavi Pand lab Bench Model, at pressures indicated in table 1) to obtain the sauce (appearance: smooth and creamy)

5 The cold, emulsified sauce was heated to boiling, hot filled in glass jars and pasteurised.

The pasteurised samples were stored for 6 weeks (chilled), opened and reheated, which resulted in a smooth, thick, sauce having good mouthfeel and appearance.

10

#### Processing example 5

Example 1 (45% parsnips, homogenised at 150 bar) was repeated, apart from that the pureed vegetable (and part of the water) and the rest of the sauce ingredients were  
15 passed through the high-pressure homogeniser (type Niro Soavi Pand lab Bench Model, at 150 bar) separately, and then mixed. In order to homogenise the vegetable puree, part of the water (30%) was added to the vegetable puree to be homogenised. The rest of the processing was the same.  
20 The resulting product was not distinguishable from the product from example 1.

#### Processing example 6

25 Identical to example 1, apart from that carrots were used, in an amount of 75% (wt), and the amount of added water was less as a consequence of the increased amount of vegetable matter.

The appearance was the same as for example 1, apart from  
30 the color (being yellowish/orange for the carrots). A slight carrot taste could be detected.

Processing example 7

Broccoli florets were cut into pieces, 2-3 cm in length and the majority of the stalk discarded. They were then treated as the parsnips in example 5. The resulting product had an appearance as the product in example 1, apart from the color (green). Mouthfeel was very much similar.

Example 8

In this example homogenised carrots have been used to thicken a tomato sauce.

Carrots were peeled, sliced and cooked in deionized boiling water for 15 minutes. The vegetables were pureed using an industrial food processor (Robocoup Juicer) with a 0.5 mm sieve. The so-obtained vegetable puree was mixed with 30% of water and passed through a high pressure homogeniser (type Niro Soavi Pand Lab Bench Model, at a pressure of 150 bar) to obtain the carrot homogenate.

Remainder of the water (see table below), tomato paste (Brix 28), oil and salt were mixed together.

The carrot homogenate was added to the tomato sauce to obtain a thick, smooth tomato sauce having the following final composition:

Ingredients	%
Homogenised carrot	20
tomato paste	7.3
Soybean oil	1.6
Salt	0.8
Water	70.3
	100

The cold sauce was heated to boiling, hot filled in glass 5 jars and pasteurised.

The pasteurised samples were stored for 6 weeks (chilled), opened and reheated, which resulted in a smooth, thick, tomato sauce having good mouthfeel and appearance.

#### 10 Example 9

A basic sauce was prepared from homogenised parsnip-puree.

The parsnips were peeled, sliced and cooked in deionized boiling water for 15 minutes. Thereafter, they were pureed 15 in an industrial food processor (Robocoup Juicer) with a 0.5 mm sieve.

The so-obtained parsnip puree was mixed with 30% of water and passed through a high-pressure homogeniser (type Niro Soavi Pand lab Bench Model, at 150 bar) to obtain a basic 20 sauce (appearance: smooth, thick and non-gritty). After chilled storage for 6 weeks the physical appearance (thick, smooth, non-gritty) was not changed.

## Claims

1. Process for thickening a liquid, pourable or squeezable foodproduct by incorporating in said foodstuff in an amount of between 5 and 80% by weight a homogenised vegetable puree obtained by subjecting a vegetable to a homogenisation treatment wherein the vegetable has a starch content of less than 70 wt% based on the dry vegetable.
2. Process according to claim 1, wherein the starch content of the vegetable is less than 50% based on the dry vegetable.
3. Process according to claim 1 or 2, wherein the vegetable used for preparing the homogenised vegetable puree is one of roots, root-like vegetables, or plants of the genus *Brassica oleracea*, all preferably being low in starch.
4. Process according to claim 1, wherein the vegetable used for preparing the homogenised vegetable puree is selected from parsnips, turnips, mushrooms, cauliflower, swede, carrots, broccoli and mixtures thereof.
5. Process according to claim 1, wherein the homogenisation treatment is carried out by a high pressure homogeniser at a pressure of 100-200 bar or any equivalent treatment using an ultrasonic homogeniser or other homogenisation treatment.

6. Process according to claim 1, wherein the homogenised vegetable puree is incorporated in the food product in an amount of between 10 and 60% by weight based on the final food product.
7. Process according to claim 6, wherein the homogenised vegetable puree is incorporated in the food product in an amount of between 20 and 45% by weight based on the final food product.
8. Process according to claim 1, wherein the food product further comprises water and optionally oil, fat, herbs, spices, comminuted vegetables, or mixtures thereof.
9. Process according to claim 1, wherein the food product is a dressing, mayonnaise, soup, sauce, simmer sauce or sauce base product.
10. Process according to any of claims 1-9, wherein further is incorporated in the liquid, pourable or squeezable foodproduct one or more of salt, herbs, spices, comminuted vegetable particles, water, organic acids, meat, vegetable oils or fats or mixtures thereof.
11. Liquid, pourable or squeezable foodproduct containing 5-80% by weight of a vegetable puree, wherein the vegetable puree has been homogenised, characterized in that the starch content of the vegetable is less than 70%, based on the dry vegetable.
12. Foodproduct according to claim 11, wherein the vegetable has been homogenised by an high pressure



homogeniser at a pressure of 100-200 bar, or any equivalent homogenising treatment.

13. Foodproduct according to claim 11 or 12, wherein the homogenised vegetable puree is present in an amount of 10-60% by weight.
14. Use of a vegetable puree, wherein the vegetable puree has been homogenised, and wherein the starch content of the vegetable is less than 70%, based on the dry vegetable, for thickening a liquid, pourable or squeezable foodstuff.

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A23L1/00 A23L1/212

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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IPC 6 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91 03168 A (HARRA JOHN) 21 March 1991 (1991-03-21) page 1, paragraph 2 page 3, line 29 - line 34 page 5, line 5 -page 6, line 27 page 6, line 34 -page 7, line 35 examples 1-3,8	1-13
X	DE 196 09 703 A (DEVE S R L) 19 September 1996 (1996-09-19) claims 1-6 column 1, line 65 -column 3, line 33 examples 1-3	1-12
X	US 4 160 849 A (BUSSIERE GUY ET AL) 10 July 1979 (1979-07-10) the whole document	1-13
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 248 515 A (PAYTON SHARON B ET AL) 28 September 1993 (1993-09-28) column 2, line 8 - line 35 column 3, line 53 - line 61 ---	10,12
A	PATENT ABSTRACTS OF JAPAN vol. 007, no. 053 (C-154), 3 March 1983 (1983-03-03) & JP 57 202257 A (YAKULT HONSHA KK), 11 December 1982 (1982-12-11) cited in the application abstract ---	
A	WO 97 05787 A (ASHOURIAN JAMSHID) 20 February 1997 (1997-02-20) page 1, line 27 -page 7, line 18 ---	1-12
A	US 4 413 017 A (LOADER MARY A) 1 November 1983 (1983-11-01) column 3, line 49 - line 68 column 5, line 37 -column 6, line 3 examples I-III ---	1,2,4-13
A	US 3 745 020 A (LIME B ET AL) 10 July 1973 (1973-07-10) column 2, line 17 -column 45 example 6 ---	1,2,4-12
A	GB 732 983 A (WILLIAM EVANS & CO.) 6 July 1955 (1955-07-06) the whole document -----	1-13

## INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat Application No

PCT/EP 99/03593

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9103168	A	21-03-1991	US 4931321 A	05-06-1990
			AU 5171590 A	08-04-1991
			EP 0507766 A	14-10-1992
			EP 0514372 A	25-11-1992
			WO 9103166 A	21-03-1991
			JP 5502786 T	20-05-1993
DE 19609703	A	19-09-1996	IT MI950492 A	16-09-1996
US 4160849	A	10-07-1979	FR 2331293 A	10-06-1977
			AT 357854 B	11-08-1980
			AT 851476 A	15-12-1979
			BE 848446 A	17-05-1977
			CA 1080023 A	24-06-1980
			CH 618586 A	15-08-1980
			DE 2651791 A	18-05-1977
			ES 453819 A	16-11-1978
			FI 763273 A,B,	18-05-1977
			GB 1571405 A	16-07-1980
			IT 1123621 B	30-04-1986
			LU 76209 A	06-06-1977
			NL 7612590 A	20-05-1977
			PT 65801 A,B	01-12-1976
			SE 427081 B	07-03-1983
			SE 7612797 A	18-05-1977
US 5248515	A	28-09-1993	NONE	
JP 57202257	A	11-12-1982	JP 1496281 C	16-05-1989
			JP 63045772 B	12-09-1988
WO 9705787	A	20-02-1997	US 5849350 A	15-12-1998
			AU 6687996 A	05-03-1997
			EP 0845952 A	10-06-1998
			US 5879737 A	09-03-1999
US 4413017	A	01-11-1983	AU 545270 B	04-07-1985
			AU 8471682 A	16-12-1982
			CA 1175711 A	09-10-1984
			JP 58000868 A	06-01-1983
US 3745020	A	10-07-1973	NONE	
GB 732983	A		NONE	